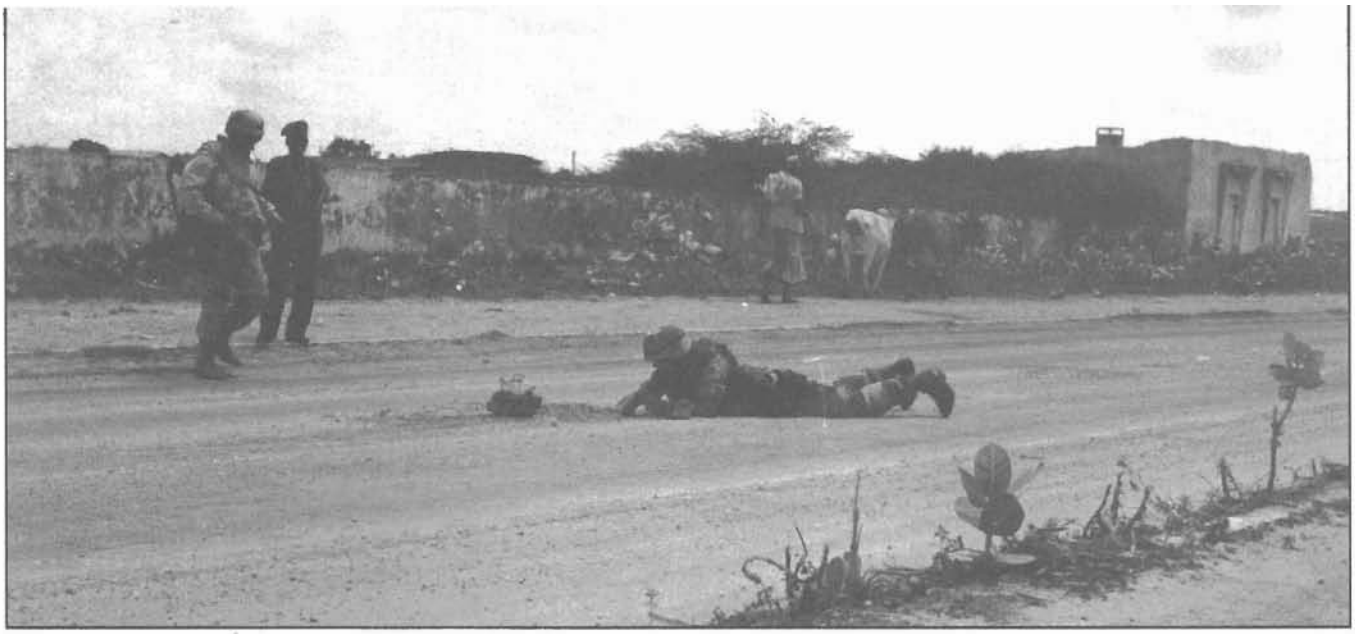

Tactics for Route Clearance

By William C. Schneck, Jr., and Brian M. Green

In Somalia, military police used mine detectors to sweep for command-detonated mines. This tactic for searching for command-detonated mines, as opposed to searching for their firing wires, is both dangerous and unnecessary.

Somalia was not the first military operation where American lines of communication (LOC) were mined.[1] Although GIs in World War II and the Korean Conflict experienced their share of mine incidents, U.S. forces in Vietnam routinely faced the threat posed by mines and ambushes along their LOC. Through trial and error, GIs have learned to operate in this difficult environment, and their experiences have produced many useful lessons regarding command-detonated mines and route clearance.

It is not possible to completely eliminate losses from mines, but commanders can take steps to significantly reduce them. Appropriate tactics combined with an aggressive training program for all personnel in theater can effectively reduce casualties and equipment losses. Experiences of U.S. forces in Vietnam and Somalia demonstrated that to ensure success, route clearance must be treated as a combined arms combat operation. Infantry, armor, engineer, artillery, aviation, intelligence, and military police support must be carefully planned and executed.

The route-clearance tactics described in this article and shown in Figure 1 and Table 1 (page 48). portray an ideal situation where optimum support is available. When tasked with a route-clearing mission, commanders can adapt the following critical mission elements and tactics to local conditions and the resources available .

Route-Clearance Techniques

In Vietnam, U.S. forces developed three viable techniques to clear routes: the deliberate sweep, the hasty sweep, and mine reconnaissance (recon).[2] Sweep rates for these techniques are shown in Table 2, page 48. The techniques may be useful in some situations in today's post-Cold War environment.

Deliberate Sweep. A deliberate sweep is a route clearance operation against a high-threat insurgent. It normally requires a reinforced infantry company team that is supported by artillery and helicopter gunships. A reserve should be held at the maneuver battalion level, ready for immediate commitment.

If the situation permits, the commander should task subordinate units to conduct a deliberate sweep when a road is initially opened for traffic, when mining is suspected and, if possible, every morning thereafter. A deliberate sweep has five elements:

- Positioning the troops
- Securing the route
- Clearing the road
- Running the convoy
- Rolling up the forces

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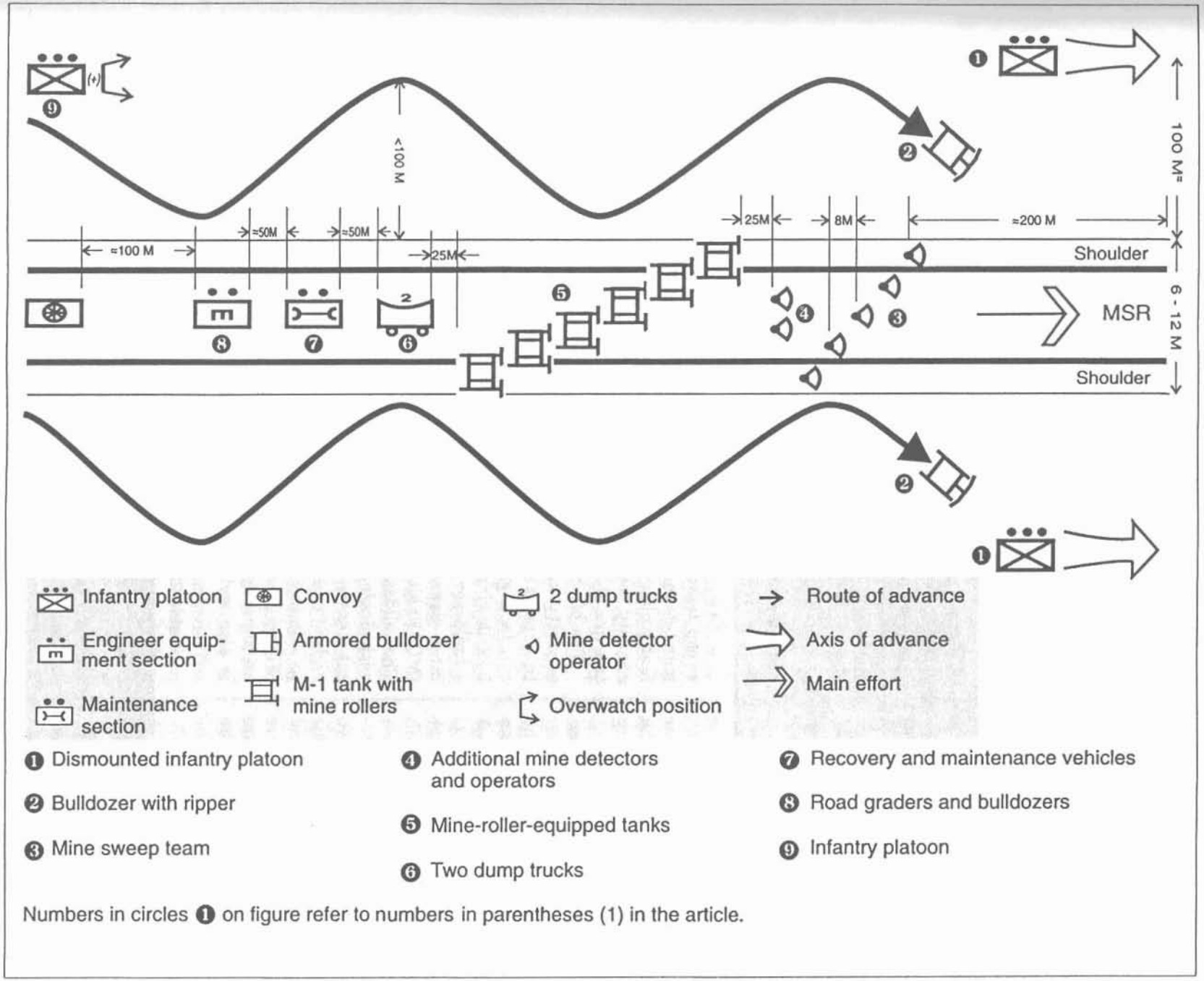

Figure 1. Infantry company team conducting a route clearance operation.

Table 1. Task organization of an infantry company team tailored for route clearance against a high-threat insurgent

Unit	Reference (Figure 1)	Unit	Reference (Figure 1)
Company command post	9	Infantry platoon (+)	9
- Mortar section (if available)	9	Armor platoon (+)	5
- Antiarmor section (if available)	9	Engineer platoon (+)*	3, 4
Infantry platoon	1	- Equipment section	6, 8
- Engineer team	1	Maintenance section	7
- Armored bulldozer	2		
Infantry platoon	1		
- Engineer team	1		
- Armored bulldozer	2		

*Route clearance is identified in the mission training plan as a task to be accomplished only by an engineer squad.

Because the first, fourth, and fifth elements are relatively routine for all combat units, only securing the route and clearing the road are discussed in detail.

- *Securing the Route.* The company team performing a deliberate sweep advances astride the main supply route (MSR) in an inverted V-formation (Figure 1). A dismounted infantry platoon (1) with an attached combat engineer team moves along each flank while carefully searching for wires and other signs of command-detonated mines or ambushes. The two infantry platoons should be far enough ahead of the engineers and the tanks of the sweep team to investigate possible sites where the enemy could observe the sweep team and activate a command-detonated mine. If the infantry platoon is near a tree line, a security team should sweep the tree line ahead of it.

The effectiveness of this flank security as a countermeasure to command-detonated mines can be significantly increased by following up each platoon with a bulldozer (2) equipped with the mine-clearing/armor protection (MCAP) kit or improvised armor.[3] The bulldozers should be equipped with single-tooth rippers that can cut a narrow, 24-inch-deep trench and cut or uncover the firing wires to command-detonated mines (Figure 2). An M9 ACE fitted with an improvised single-tooth ripper is also well suited to this task. These vehicles may be employed as far as 100 meters off the road, terrain permitting, and should zigzag their routes to locate firing wires laid parallel with the road.[4] Roller-equipped tanks should precede them when antitank mines are expected off-road. If vehicles fitted with single-tooth rippers are not available, dismounted personnel with the flank security elements can accomplish a similar effect by dragging picks along the ground.

- *Clearing the Road.* The minesweep teams (3) move down the road at the point of the inverted V-formation. FM 5-34 recommends one sweep team of eight engineers for every 2 meters of road width, including road shoulders. Depending on the width of

Table 2. Mine sweep rates

Sweep Type	Era	Sweep Rate (kph)
Deliberate	Vietnam	0.25
Deliberate	Current	1-3
Hasty	Vietnam	1-3
Hasty	Current	3-5
Mine recon	Vietnam	15

Figure 2. This Pakistani D7 bulldozer is equipped with a ripper fitted with MCAP. While used to clear roadblocks in Mogadishu, it is also well suited for locating firing wires.

the route to be swept, the engineer platoon may need to acquire additional detectors from its parent or supported unit to perform this mission. [5] Demolition and local security teams may support more than one sweep team. When they do, the number of engineers can be reduced by as much as 25 percent.

To eliminate electronic interference between mine detectors and to reduce the possibility of multiple casualties from an accidental mine detonation, echelon the sweep teams with an 8-meter interval between detectors. Two additional mine detectors and operators (4) should follow them. The additional assets provide a reserve that allows the recommended rotation of operators approximately every 20 minutes and may reduce the time needed to sweep difficult areas such as culverts and bridges. These teams should be augmented with EOD personnel if they are available.

Proofing devices such as mine-roller-equipped tanks (5) follow the sweep teams. Loaded 5-ton dump trucks driven in reverse (to reduce the possibility of driver injury in a mine detonation) or some type of improvised, easily repaired mine roller (Figure 3, page 50) may be fabricated and used as an expedient. A wrecker and a truck carrying repair parts and maintenance personnel should follow the roller.

When improvising a roller, design it for a vehicle 5 tons or larger in size. To avoid driving over unproofed ground during turns, consider the vehicle's turning "footprint" in the design process. A sheepsfoot roller is an effective expedient against pressure-fuzed mines.

Deploy the proofing devices in echelon to provide complete coverage of the road and the road shoulders. Because of the track-width coverage of rollers in the Battalion Countermine Set, three M1 tanks equipped with mine rollers are required to fully proof a road up to 6 meters wide, and six M1s are required to proof a road 6 to 12 meters wide. The Battalion Countermine Set issued to M1 tank units contains only four sets of rollers. Because divisional MSRs are usually more than 6 meters wide, units may need to acquire additional assets from another armored battalion or improvise some other means of proofing.

Tanks are vulnerable to command-detonated mines, and the flank security elements and the sweep teams should always precede the tanks if such mines are expected. It would be tragic as well as embarrassing if CNN broadcast footage of a multimillion dollar M1 and its highly trained crew that had been destroyed by an improvised mine costing less than $50. The proofing vehicles should maintain an interval of 25 meters between each other and from all dismounted personnel to lessen the possibility of casualties if an undetected mine detonates.

If the enemy is expected to use roadblocks, support the proofing vehicles with a CEV, an M9 ACE, or an armored bulldozer. These vehicles can push a roadblock out of the way after the sweep team has thoroughly checked it for mines and booby traps. In Vietnam, the Vietcong emplaced roadblocks in-depth but only mined or booby-trapped the last few.

Two dump trucks (6) loaded with gravel to fill craters and chuckholes follow the proofing vehicles. Areas over culverts and road repairs should be capped with asphalt or quick-setting concrete to make enemy mining more

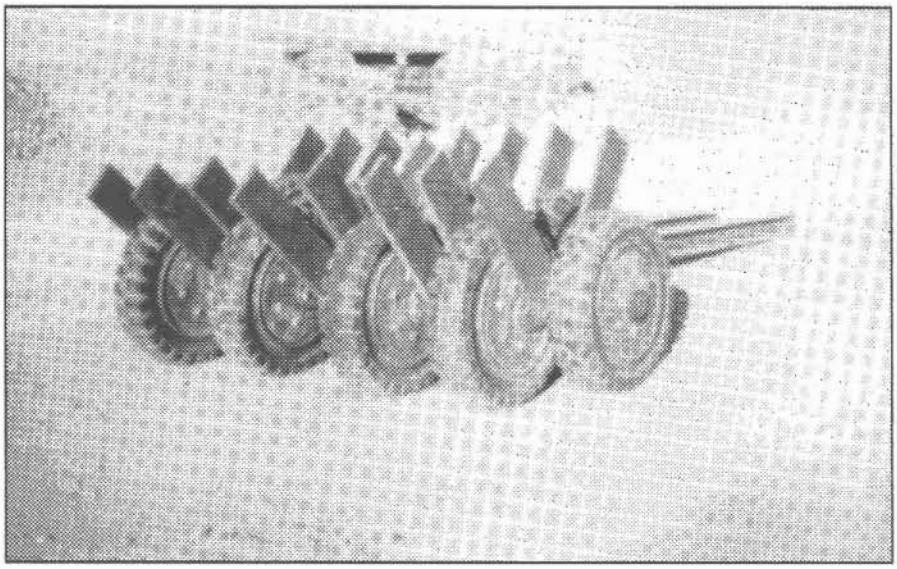

Figure 3. An improvised mine roller built by the 27th Airborne Combat Engineer Battalion for Operation Desert Storm.

difficult to perform and easier to detect. Recovery and maintenance vehicles (7) follow next and, if necessary, graders and bulldozers (8) follow them to improve the road surface and drainage.

The company command post (CP) should accompany the last infantry platoon (9), which provides overwatching fires to the flank security and the sweep teams throughout the operation. If the CP and infantry platoon are mechanized, they remain mounted. The commander must carefully synchronize the movements of this platoon to ensure a continuous overwatch without disrupting his covering fires and the progress of other subordinate units. One way to do that is to bound part of the overwatch team forward while the remainder continues to provide covering fires. The remainder of the platoon bounds forward only after the other overwatch element is ready. If Bradleys or M113s are assigned to the dismounted platoons, they may either follow those platoons to provide close support or position themselves with the overwatching platoon to increase its firepower.

The entire column on the road, from the lead sweep team to the last piece of engineer equipment, is about 500 meters long. If lead security elements are included, the formation is about 700 meters long. These figures do not include any convoys that follow the route sweep.

After the sweep is completed, engineer road repair teams must be on call to repair any subsequent road damage.

Despite the repetitious nature of route clearance, soldiers must remain alert and dispersed at all times. In any other posture, they are subject to multiple casualties from ambush or command-detonated mines.

Cities and other terrain with narrow avenues of approach and restricted fields of fire present a very difficult challenge in route-clearance operations. Units operating in such terrain may need to modify their route-clearing tactics to fit the situation, but the key point is to find the firing wires to command-detonated mines before the mines are found. Because intense close combat is likely to occur during route clearance, commanders must emphasize survivability and firepower when selecting units and equipment for such missions.

Hasty Sweep and Mine Reconnaissance. The existence of hasty-sweep and mine-recon procedures is a tacit acknowledgement that the "100 percent solution" usually is not feasible and that commanders must accept a reasonable amount of risk. As always, the commander must determine the proper balance between risks and requirements. The tactics used for a hasty sweep and a mine recon are based on those for the deliberate sweep but are modified to meet time and resource constraints.

In a hasty sweep, mine detector operators walk at a normal pace, sweeping back and forth. They must check suspicious areas thoroughly.[6] A hasty sweep may be conducted in the morning before routine convoy operations begin, or the sweep team may lead the convoy during movement.

In some situations, commanders may use a mine recon instead of a hasty sweep. For example, a mine recon may be used on a heavily traveled MSR that has had no mine incidents for some time, a previously swept hard-topped MSR, or an MSR that is secured by friendly troops along its entire length.

In a mine recon, a mounted engineer team slowly drives over a route before it is opened to daily traffic to look for evidence of mining activity. The team should dismount and thoroughly sweep suspicious areas. In another method of mine recon, engineers are placed in the lead vehicle of a convoy to watch for mine indicators. To be effective, these techniques must be used at speeds less than 15 kilometers per hour.

Beginning in January 1994, commercial infrared cameras were used to augment mine recons performed in Somalia. These cameras were effective at finding buried mines on roads from a standoff of about 30 meters. Their performance, however, was significantly degraded in windy or rainy conditions or where vegetation grew close to the mine. The infrared cameras did not increase the

Table 3. Methods of decreasing vulnerability to mines

Method	*Remarks*
Mine intelligence	Analysis of enemy mining activity may provide exploitable patterns.[8]
Rewards for information	Local civilians may provide useful information on enemy mining activities for a price. Ground speakers and hand-delivered leaflets are more effective than air-dropped leaflets and aerial loud speakers. Although the area covered is considerably smaller, the message is more effective because it is more personal.
Eagle flights or thunder runs	Eagle flights are periodic helicopter overflights; thunder runs are periodic mounted patrols. Conducted at irregular intervals (day or night), they are effective at reducing mine and ambush incidents. Against a severe threat, these patrols should be augmented with stay-behind ambush patrols and snipers. Roads previously cleared should not be considered secure unless constant surveillance has been maintained.
Main supply route (MSR) checkpoints	Security must be an integral part of any successful route-clearance mission. Checkpoints provide 24-hour surveillance of vulnerable stretches of MSR. Aggressive patrolling (mounted and dismounted) and surveillance of an MSR during periods when it is not in use makes it difficult for the enemy to lay mines.
Tactical land clearance	This deprives the enemy of concealment and improves friendly fields of fire. FM 5-164 describes the use of Rome plows and similar equipment.[9]
Road treatment	Mining activities are easier to detect with certain types of road treatment. Paving roads is one of the most effective means to counter enemy mines because holes in asphalt are difficult to dig and easy to identify. Even if an asphalt spreader is used only to put lines of asphalt mix on a road, any disturbance of the pattern is easily recognized and difficult to camouflage at night, when many insurgent mines are laid. Some dust-control treatments (such as diesel/RC-3 mixture, peneprime or partially refined crude oil) also aid mine sweep teams in visual mine detection.[10]
Improvised armor for wheeled vehicles	Sandbags and add-on armor kits reduce casualties. Several countries, including South Africa, have fielded extremely effective mine-resistant vehicles.[11]
Thorough rehearsals	Rehearsals ensure proper unit reaction in the event of enemy contact and/or mine detonation. This is especially important for convoys composed of units that have not worked together before.[12]
Preplanned fire support	Range fans should cover the entire route; if not, arrange to have attack helicopters cover the route.
Avoid predictability	The enemy will find a flaw and exploit it. Many units establish a procedure for mine sweeps and then never deviate from it. While this approach may assure the commander of a thorough, well-controlled sweep, it also gives the enemy the advantage of being able to predict movements. Then he is able to place mines to inflict maximum damage.
Remain dispersed	After a mine incident, establish security and clear the area with a sweep team. Do not cluster around casualties.
Enforce mine discipline	Proper execution of individual tasks minimizes casualties.
Multiple starting points	This allows work to be accomplished in parallel, not in a series.
Unit consistency	Always assign the same team to the same section of road so team members become familiar with local conditions and enemy tactics.
Follow-on neutralization	Mines are marked by the sweep teams and neutralized after the sweep teams have advanced out of the danger area. This technique should only be used if security forces can provide adequate overwatch to the sweep team.
Reserve proofing devices	This allows the sweep to continue uninterrupted if one proofing device is damaged.
Litter-control campaign	Inform road users not to leave metallic trash on the MSR because it may give false positive readings on mine detectors.

References And Endnotes

Note: Except as noted below, all information in this article was extracted from *Vietnam, Lessons Learned, Landmine and Countermine Warfare,* Engineer Agency for Resources Inventories, Washington, D.C., August 1972.

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[1] *After Action Report, Operation Restore Hope*, William Schneck, Belvoir Research, Development & Engineering Center, Fort Belvoir, Virginia, 13 June 1994. Hereafter referred to as "Operation Restore Hope AAR."

[2] For current doctrine, see Field Manual 20-32, *Mine/Countermine Operations,* Chapter 10, 30 September 1992, (with Change 1, 17 August 1994). Collective (unit) skills are found in the Mission Training Plan for the Combat Engineer Platoon (Airborne, Air Assault, Motorized Division and Airborne Corps, ARTEP 5-025-1 1 -MTP, October 1989, pages 5-104 to 5-107. Additional nondoctrinal information is in Sapper Countermine Guide, BRDEC PAM 350-4, November 1990, page 150.

[3] *The United States Army Engineer After Action Report for Operations Desert Shield and Desert Storm,* US Army Engineer School, Fort Leonard Wood, Missouri, July 1993, pages Sustainment-14 to Sustainment-15.

[4] *Operation Restore Hope AAR*, page 22. Radio-controlled mines, although relatively rare, may require electronic warfare assets to effectively counter them.

[5] FM 5-34, *Engineer Field Data*, September 1987, pages 2-5.

[6] This technique is more closely related to the deliberate sweep described in Field Manual 20-32, *Mine/Countermine Operations,* September 1992, page 10-1, than the technique that was called a deliberate sweep in Vietnam, as described in this article. The thoroughness of the hasty sweep described in the current Field Manual 20-32 falls between the hasty sweep and mine recon of the Vietnam War.

[7] *Detection of Land Mines in Somalia Using Commercial Infrared Cameras (U)*, AMSEL-NV-TR-0117, by Harry N. Hambric, August 1994.

[8] Training Circular 5-31, *Viet Cong Boobytraps, Mines and Mine Warfare Techniques,* Headquarters, Department of the Army, Washington, D.C., 18 December 1969, pages 6-10.

[9] Field Manual 5-164, *Tactical Land Clearing*, August 1974.

[10] Basic Report, Volume 1, *Study and Evaluation of Countermine Activities (SECMA)*, Army Concept Evaluation Team in Vietnam, 26 September 1968, page 19, Annex C and Technical Manual 5-337, *Paving and Surfacing Operations*, February 1966, page 72.

[11] *The Development of Mine Resistant Vehicles*, by William Schneck, Proceedings of the Fifth Annual TACOM Combat Vehicle Survivability Symposium (U), Volume 1. April 1994, pages 83 to 101.

[12] *Convoy Ambush on Highway 1*, by John Albright, Seven Firefights in Vietnam, Center of Military History, US Army, 11 October 1984, Washington, D.C., pages 41-58.

speed of mine recons in Somalia, but their detection rate against US-emplaced unfuzed "control" mines was 100 percent with no positive false alarms.[7]

Sweep rates for various route-clearance techniques are shown in Table 2. Some methods that may decrease vulnerability to mines and increase sweep rates are listed in Table 3.

Conclusion

The maintenance of secure LOC is a critical task that permits other combat operations to be successfully undertaken and sustained. Treating route clearance as an administrative task rather than a combined arms combat operation will often result in failure. Maneuver commanders must allocate sufficient resources and adequately prepare personnel for route clearance to ensure success. Considering the increased likelihood of conducting operations other than war and the vulnerability of LOC in such environments, it is critical that U.S. forces be prepared to effectively execute route-clearance operations.

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